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Frank Jansen

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EXAMINER

MOORE, KARLA A

ART UNIT

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1792

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/774,841	Applicant(s) JANSEN, FRANK	
	Examiner KARLA MOORE	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 12-15 and 17-23 is/are pending in the application.
- 4a) Of the above claim(s) 1-7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8, 9, 12-15 and 17-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 21-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 21 recites the limitation "a substrate" in line 9, "having substrate film" in line 10, the "substrate film" in line 12 and "receiving substrate film" in line 14 thereof. There is either insufficient antecedent basis for these limitations in the claim or there is lack of consistency in referring to the substrate, rendering the claims unclear. For examination purposes, Examiner has examined the above limitations as referring to "the substrate" in each instance. Examiner requests correction and/or clarification.

4. Claim 23 recites "an opening" twice to refer to two different openings. For clarity, Examiner would suggest that the claims be amended to recite "a first opening" and "a second opening" in order to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Also, Examiner has examined all references to "a/the substrate film" as referring to "the substrate".

5. Applicant's cooperation is requested in correcting any other clarity issues with the pending claims. For example, consistency in referring to the same structure(s) throughout the claims is requested.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 8-9, 12, 17 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,058,430 to Suntola et al. in view of U.S. Patent Publication No. 2004/0194691 A1 to George et al. , U.S. Patent No. 5,300,189 to Kokaku et al. and U.S. Patent No. 6,312,524 to Ogawa et al.

8. Regarding claims 8-9, 17 and 21: Suntola et al. disclose a method for preparing a coated substrate substantially as claimed and comprising: providing an atomic layer deposition arrangement comprising an evacuable chamber, and at least two atomic layer deposition sources within the chamber, wherein each atomic layer deposition source is isolated from the remainder of the chamber, conveying a substrate past each atomic layer deposition source in succession, and exposing the substrate to each atomic layer deposition source as the substrate is conveyed past. Several embodiments for achieving this method are disclosed. See Figures 1-5, for example. Suntola et al. further includes the teaching that ALD growth is attainable within several types of growing equipment and that the *essential* features for such growth are the deposition sources temperatures, substrate temperature and stepwise interactions

between the substrates and the deposition sources (column 8, rows 38-42). Also see, column 11, rows 5-27, where it is disclosed that further variations and modifications may be made to the explicitly disclosed embodiments.

9. Suntola et al. disclose the method for preparing a coated substrate substantially as claimed and as described above.

10. However, Suntola et al. fail to disclose the substrate as a continuous, flexible polymer film substrate.

11. George et al. teach that it is known in the coating art to perform an ALD method comprising depositing inorganic materials onto a polymer film substrate for the purpose of making ultra-thin, conformal coatings (abstract).

12. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have performed an ALD method comprising depositing inorganic materials onto a polymer film substrate in Suntola et al. in order to make ultra-thin, conformal coatings as taught by George et al.

13. It is noted that while George et al. fail to explicitly further define the disclosed polymer film substrates as continuous and/or flexible, Examiner would submit that one of ordinary skill in the art would more than likely interpret the disclosure to include continuous, flexible, polymer film substrates as described at paragraphs 16-17, for example. The polymer film substrates are described including thermoplastic substrates (i.e. suggesting that they are flexible) and as an alternative to the disclosed polymer film substrates, polymer sheet substrates are also disclosed (i.e. suggesting that they are continuous in comparison). Nevertheless, additional prior art is provided and relied

upon below that further suggests the obviousness of use of a continuous, flexible polymer film substrate in a deposition arrangement.

14. Suntola et al. and George et al. disclose the invention substantially as claimed and as described above.

15. However, the combination of Suntola et al. and George et al. fails to teach the use of a continuous, flexible polymer film substrate as the deposition substrate in the method or to teach the method further including providing a rotatable substrate source drum having the polymer film substrate wrapped there around, and providing a rotatable collection drum, rotating the substrate source drum and conveying the polymer substrate film into the chamber and rotating the collecting drum and receiving the polymer substrate film exiting the chamber or the provision of

16. Kokaku et al. teach the following provisions in a multilayer processing method wherein a film substrate is conveyed past a plurality of deposition sources on a rotatable "processing" drum located in a chamber: providing a rotatable substrate source drum having a substrate film wrapped there around, and providing a rotatable collection drum, rotating the substrate source drum to carry the film substrate into the chamber where the rotating "processing" drum is provided across from the deposition sources thus facilitating a deposition process and rotating a collection drum and receiving the substrate film exiting the chamber on the collection drum for the purpose of forming a multilayer film with high efficiency without uselessly complicating construction of the processing apparatus (Figure 3, abstract and column 5, rows 60 through column 6, row

1). Further, it is noted that Kokaku et al. disclose the use of a continuous, flexible, polymer film substrate as the article worked upon (column 5, rows 55-59).

17. Supplementing the teachings of Suntola et al., George et al. and Kokaku et al. is Ogawa et al., which is also drawn to deposition on a continuous, flexible, polymer film substrate within an evacuated chamber (column 11, rows 33-39). Ogawa et al. further disclose the provision of separate chambers (Figure 1, 21 <film forming chamber> and 20 <carrying chamber>) for performing the deposition and for housing the substrate source drum and the collection drum, respectively, for the purpose of enabling independent control of the degree of vacuum of each such that processing conditions are not generated in the carrying chamber (column, 11, rows 27-31).

18. Given the aforementioned teachings by Kokaku et al. and Ogawa et al. and the teachings provided by Suntola et al. and George et al. that an ALD method can be practiced in several types of apparatus given that the presence of the three essential features that are discussed above and which the apparatus' of Kokaku et al. and Ogawa et al. would be capable of providing, it would have been obvious to one of ordinary skill in the art to have provided the rotatable substrate source drum having a continuous, flexible, polymer substrate film wrapped there around allowing the substrate to enter the chamber, and to also to have provided a rotatable collection drum allowing the substrate to exit the chamber with the rotating "processing" drum provided there between in the chamber across from the deposition sources thus facilitating the deposition process in Suntola et al. and George et al. in order to form a multilayer film with high efficiency without uselessly complicating construction of the processing apparatus and in order to

enable independent control of a degree of vacuum around the rotatable "processing", source and collection drums as taught by Kokaku et al. and Ogawa et al.

19. With respect to claim 12, George et al. further teach using the ALD method to form a barrier coating layer on a polymer substrate, wherein the polymer substrate is polyethylene terephthalate, low density polyethylene, high density polyethylene, polypropylene, polycarbonate, polyvinylidene chloride, polyacrylate or polyamide for the purpose of imparting desirable properties to the polymer substrate (paragraphs 16-18 and 53-54). Also see column 11, rows 33-39 of Ogawa et al.

20. With respect to claim 20, it is taught that the barrier coating deposited on the polymer substrate in George et al. has a thickness of 400 angstroms to 50 angstroms (i.e. between about 40 nm and 5 nm) such that desirable properties are imparted to the polymer substrate (paragraphs 53-54).

21. With respect to claims 22, in Ogawa et al. the substrate source drum and the collection drum are in a winding chamber (20) separate from the evacuable chamber (21).

22. With respect to claim 23, in Ogawa et al., the step of conveying the film substrate into the evacuable chamber comprises conveying the film substrate through a first opening that is minimized to minimize fluid communication between the evacuable chamber and the winding chamber and the step of receiving the film substrate exiting the evacuable chamber further comprises conveying the film substrate through a second opening that is minimized to minimize fluid communication between teh

evacuatable chamber and the winding chamber (see Figure 1 and column 11, rows 15-17).

23. Claims 13, 15 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suntola et al., George et al., Kokaku et al. and Ogawa et al. as applied to claims 8-9, 12, 17 and 20-23 above, and further in view of U.S. Patent Publication No. 2002/0043216 A1 to Hwang et al.

24. Suntola et al., George et al., Kokaku et al. and Ogawa et al. disclose the invention substantially as claimed and as described above.

25. However, Suntola et al., George et al., Kokaku et al. and Ogawa et al. fail to disclose methods wherein at least one of the at least two atomic layer deposition sources is a source of trimethylaluminum or an oxidizing agent.

26. Hwang et al. disclose an ALD method using sources of trimethylaluminum, an oxidizing agent (i.e. water vapor) and inert gas (i.e. argon) for the purpose of forming uniform ALD thin films (paragraph 46).

27. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided sources of trimethylaluminum, an oxidizing agent (i.e. water vapor) and inert gas (i.e. argon) in Suntola et al., George et al., Kokaku et al. and Ogawa et al. in order to form uniform ALD thin films as taught by Hwang et al.

28. Claim 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hwang et al. and George et al. as applied to claims 13, 15 and 18-19 above, and further in view of U.S. Patent Publication No. 2003/0207032 to Ahn et al.

29. Suntola et al., George et al., Kokaku et al., Ogawa et al. and Hwang et al. disclose the method for preparing a coated substrate substantially as claimed and as described above.

30. However, Suntola et al., George et al., Kokaku et al., Ogawa et al. and Hwang et al. fail to teach the oxidizing agent is oxygen, nitrous oxide and ozone.

31. Ahn et al. disclose use of oxygen, nitrous oxide and ozone as oxidizing agents along with trimethylaluminum in a semiconductor ALD process for producing a coating of aluminum oxide for the purpose of forming a highly uniform ultra-thin layer (abstract, paragraphs 5, 18 and 30).

32. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided oxygen, nitrous oxide or ozone as the oxidizing agent in the coating method of Suntola et al., George et al., Kokaku et al., Ogawa et al. and Hwang et al. in order to form a highly uniform ultra-thin layer as taught by Ahn et al.

Response to Arguments

33. Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection. Ogawa et al. is newly relied upon for explicit teachings of a deposition arrangement comprising a continuous,

flexible polymer film substrate and separate chambers for housing the rotatable processing drum and the source and collection drums, as well as the conveying steps further comprising minimized openings to minimize communication between the separate chambers.

Conclusion

34. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KARLA MOORE whose telephone number is (571)272-1440. The examiner can normally be reached on Monday-Friday, 9:00 am-6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571.272.1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Karla Moore/
Primary Examiner, Art Unit 1792
17 September 2008